

REMARKS

In the Drawings

The drawings have been objected to as failing to comply with 37 CFR 1.84(p)(5). Applicants appreciate the Examiner's observations and have amended the drawings and specification to address the Examiner's concerns. In particular, Figure 1 has been amended to delete reference numeral 38. Figure 2 has been amended to correct reference numerals 58 and 80 to 60 and 82 respectively. Finally, the specification has been amended at paragraph [0022] to correct references to items 74, 76, and 92.

The drawings have also been objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "102" has been used to designate both "voltage signal" and "printed circuit board". Applicants appreciate the Examiner's observations and have amended the drawings and specification to address the Examiner's concerns. In particular, Figure 1 has been amended to correct reference numeral 102 as 101 and the specification at paragraph 20 has been amended to refer to reference numeral 101.

In the Specification

The abstract of the disclosure has been objected to because it contains more than 150 words and uses legal phraseology. Applicants appreciate the Examiner's observations and have amended the Abstract to address the Examiner's concerns.

Claim Disposition

Claims 1 – 132 are pending in the application. Claims 8 – 17 and 32 are allowed. Claims 5, 6, 18, 21 – 31 are objected to. Claims 1 – 4, 7, 19, and 20 are rejected. Claims 17 and 21 have been amended.

Claim Objections

Claims 21-29 are objected to because of the following informalities: Claim 21, a pass

should be placed between “sensorsensing” on line 2. Applicants appreciate the Examiner’s observations and have amended Claim 21 accordingly to address the Examiner’s concerns. The Examiner’s attention is directed to note that Claim 17 has been amended to add a period.

Claim Rejections -35 USC § 102

Claims 1, 3-4, 19 and 20 stand rejected under 35 U.S.C. 102(b) as being anticipated by Moore et al. U.S. Patent No. 4,520,681, hereinafter referred to as Moore. Applicants respectfully suggest that the Examiner has mischaracterized the teachings of Moore. The Examiner states:

With respect to Claim 1, Moore et al discloses a torque sensor for determining the torque acting upon a shaft, the torque sensor comprising a radiation source 20,24 emitting radiation of at least one wavelength; at least one sensor 22,26 sensing the emitted radiation generating thereby at least one intensity signal indicative of the intensity of the emitted radiation; at least one signal conditioner 12,14,16,18 receptive of the emitted radiation and positioned on a shaft 28 between the radiation source 20,24 and the at least one sensor 22,26 thereby conditioning the emitted radiation; and a circuit 60 receptive of the at least one intensity signal determining thereby the torque acting upon the shaft 28 and compensating for the attenuation of the emitted radiation (col. 3 lines 6-57, col. 4 lines 19-43, col. 5 lines 10-49).

With respect to Claim 3, Moore et al discloses the torque sensor as set forth in Claim 1 wherein the at least one signal conditioner 12,14,16,18 comprises a plurality of polarizers 16,18 having polarization axes oriented at a prescribed angles with respect to one another (col. 3 lines 1-26).

With respect to Claim 4, Moore et al discloses the torque sensor as set forth in Claim 3, wherein the plurality of polarizers 16,18 are substantially opaque to radiation at first wavelength 74 and substantially transparent to radiation at the second wavelength 76 (col. 5 lines 10-64).

With respect to Claim 19, Moore et al discloses the torque sensor as set forth in Claim 1 wherein the circuit 60 is receptive of the at least one intensity signal thereby determining the torque acting upon the shaft 28 (col. 5 lines 10-68, col. 6 lines 1-59).

With respect to Claim 20, Moore et al discloses the torque sensor as set forth in Claim 1 wherein the circuit 60 is receptive of the at least one intensity signal thereby controlling the wavelength of the emitted radiation

(col. 5 lines 10-68, col. 6 lines 1-59).

Applicants respectfully contend that Moore does not teach or disclose each element of the invention. To anticipate a claim under 35 U.S.C. §102, a single source must contain all of the elements of the claim. Lewmar Marine Inc. v. Barient, Inc., 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), cert. denied, 484 U.S. 1007 (1988). Moreover, the single source must disclose all of the claimed elements “arranged as in the claim.” Structural Rubber Prods. Co. v. Park Rubber Co., 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1271 (Fed. Cir. 1984). Missing elements may not be supplied by the knowledge of one skilled in the art or the disclosure of another reference. Titanium Metals Corp. v. Banner, 778 F.2d 775, 780, 227 U.S.P.Q. 773, 777 (Fed. Cir. 1985).

With respect to Claim 1, Applicants respectfully contend that Moore does not teach or disclose each element of the invention “arranged as in the claim”. Specifically, Moore does not teach or disclose, “at least one signal conditioner receptive of the emitted radiation **and positioned on a shaft between the radiation source and the at least one sensor** thereby conditioning the emitted radiation”. To support the rejection the Examiner relies on items 12, 14, 16, and 18 of Moore. However, Moore teaches that reference numerals 12 and 14 correspond to disks, while 16 and 18 correspond to slots in disks 12 and 14 respectively. There is no teaching of a signal conditioner in Moore. Moore merely teaches of a slotted disk that only passes a pulse of light when the slot passes the light source 20. More particularly, the light signal transmitted to the detector 22 is not changed or “conditioned” by the disks 12, 14.

Moreover, Moore does not teach or disclose, “a circuit receptive of the at least one intensity signal determining thereby the torque acting upon the shaft **and compensating for the attenuation of the emitted radiation.**” Once again, to support the rejection the Examiner relies on Moore at (col. 3 lines 6-57, col. 4 lines 19-43, col. 5 lines 10-49) however, at none of the cited references does Moore teach or disclose anything what so ever with respect to “compensating for attenuation of emitted radiation.” In fact, Moore teaches quite the opposite at Col. 5 lines 29 and 30 by illustrating that a digital signal is employed and that amplitude variations, and variation in light intensity do not effect the data. Therefore,

because Moore does not disclose or teach an element of the invention it cannot anticipate the Applicants' claims. Thus, Claim 1 is allowable, the rejection is improper, and it should be withdrawn.

In addition, Claims 2 - 4, 7, 18, 19, 20, 30, and 31 include the same limitations as Claim 1 an allowable claim and therefore, are also allowable, are improperly rejected. Thus, the rejections of Claims 2 - 4, 7, 18, 19, 20, 30, and 31 should be withdrawn. Moreover, Claims 2 - 4, 7, 18, 19, 20, 30, and 31 are dependent from Claim 1, an allowable claim, and therefore Claims 2 - 4, 7, 18, 19, 20, 30, and 31 must also be allowable. Thus, Claims 2 - 4, 7, 18, 19, 20, 30, and 31 are allowable, the rejections are improper, and they should be withdrawn.

With respect to Claim 3, Applicants respectfully contend that Moore does not teach or disclose each element of the invention "arranged as in the claim". Specifically, Moore does not teach or disclose, "at least one signal conditioner comprises **a plurality of polarizers having polarization axes oriented at a prescribed angle with respect to one another**". To support the rejection the Examiner relies on items 12, 14, 16, and 18 of Moore and Col. 3 lines 1 – 26. However, Moore includes absolutely no teaching of the disks 12, 14 or slots 16, 18 being polarizers, nor that that would have a polarization axis oriented at a prescribed angle. Therefore, because Moore does not disclose or teach an element of the invention it cannot anticipate the Applicants' claims. Thus, Claim 3 is allowable, the rejection is improper, and it should be withdrawn.

In addition, Claim 4 includes the same limitations as Claim 3 an allowable claim and therefore, is also allowable, and improperly rejected. Thus, the rejections of Claim 4 should be withdrawn. Moreover, Claim 4 is dependent from Claim 3, an allowable claim by reason of the arguments above, and therefore Claim 4 must also be allowable. Thus, Claim 4 is allowable, the rejection is improper, and it should be withdrawn.

With respect to Claim 4, Applicants respectfully contend that Moore does not teach or disclose each element of the invention "arranged as in the claim". Specifically, Moore does not teach or disclose, "wherein the plurality of polarizers are substantially opaque to radiation at the first wavelength and substantially transparent to radiation at the second wavelength". Moore includes absolutely no teaching of the disks 12, 14 and/or slots 16, 18

being polarizers, nor that the transmissibility of the disks is a function of wavelength. Therefore, because Moore does not disclose or teach an element of the invention it cannot anticipate the Applicants' claims. Thus, Claim 4 is allowable, the rejection is improper, and it should be withdrawn.

With respect to Claim 20, Applicants respectfully contend that Moore does not teach or disclose each element of the invention "arranged as in the claim". Specifically, Moore does not teach or disclose, "the circuit is receptive of the at least one intensity signal thereby controlling the wavelength of the emitted radiation." Once again, Moore includes absolutely no teaching with respect to the wavelength of the emitted radiation or controlling the wavelength. There is no teaching in col. 5 lines 10-68, or col. 6 lines 1-59 as relied upon by the Examiner to this effect. Therefore, because Moore does not disclose or teach an element of the invention it cannot anticipate the Applicants' claims. Thus, Claim 20 is allowable, the rejection is improper, and it should be withdrawn.

Claims 1 and 2 stand rejected under 35 U.S.C. 102(b)? as being anticipated by Gutjahr et al. U.S. Patent No. 6,513,394 B1, hereinafter referred to as Gutjahr. Applicants respectfully suggest that the Examiner has mischaracterized the teachings of Gutjahr. The Examiner states:

"With respect to Claim 1, Gutjahr et al discloses a torque sensor 1 for determining the torque acting upon a shaft 2,3, the torque sensor 1 comprising a radiation source 15 emitting radiation of at least one wavelength; at least one sensor 9 sensing the emitted radiation generating thereby at least one intensity signal indicative of the intensity of the emitted radiation; at least one signal conditioner 10,12 receptive of the emitted radiation and positioned on a shaft 2,3 between the radiation source 15 and the at least one sensor 9 thereby conditioning the emitted radiation; and a circuit receptive 18 of the at least one intensity signal determining thereby the torque acting upon the shaft 2,3 and compensating for the attenuation of the emitted radiation (col. 4 lines 47-57 {Fig. I})."

"With respect to Claim 2, Gutjahr et al discloses the torque sensor as set forth in Claim 1 wherein the radiation source 15 comprises a plurality of parallel light emitting diodes having alternate anodes connected either to electrical ground or energized by a prescribed voltage and alternate cathodes connected either to electrical ground or energized by the prescribed voltage

(col. 5 lines 8-19).”

With respect to Claim 1, Applicants respectfully contend that Gutjahr does not teach or disclose each element of the invention “arranged as in the claim”. Specifically, Gutjahr does not teach or disclose, “at least one signal conditioner receptive of the emitted radiation **and positioned on a shaft between the radiation source and the at least one sensor** thereby conditioning the emitted radiation”. To support the rejection the Examiner relies on items 10 and 12 of Gutjahr. However, Gutjahr teaches that reference numeral 10 corresponds to a window in carrier 8, while 12 corresponds to a solar cell. There is no teaching of a signal conditioner in Gutjahr. Gutjahr merely teaches of a disk with a hole in it that only passes a pulse of light when the window passes the light source 15. More particularly, the light signal transmitted to the detector 12 is not changed or “conditioned” by the carrier 8, window 12 or light source 12.

Moreover, Gutjahr does not teach or disclose, “a circuit receptive of the at least one intensity signal determining thereby the torque acting upon the shaft **and compensating for the attenuation of the emitted radiation.**” Once again, to support the rejection the Examiner relies on Gutjahr at col. 4 lines 47-57, however, at none of the cited references does Gutjahr teach or disclose anything what so ever with respect to “compensating for attenuation of emitted radiation.” There is no teaching what so ever with respect to compensation of the radiation from the light source 15. Therefore, because Gutjahr does not disclose or teach an element of the invention it cannot anticipate the Applicants’ claims. Thus, Claim 1 is allowable, the rejection is improper, and it should be withdrawn.

In addition, Claim 2 includes the same limitations as Claim 1 an allowable claim and therefore, is also allowable, and improperly rejected. Thus, the rejections of Claim 2 should be withdrawn. Moreover, Claim 2 is dependent from Claim 1, an allowable claim by reason of the arguments above, and therefore Claim 2 must also be allowable. Thus, Claim 2 is allowable, the rejection is improper, and it should be withdrawn.

With respect to Claim 2, Applicants respectfully contend that Gutjahr does not teach or disclose each element of the invention “arranged as in the claim”. Specifically, Gutjahr does not teach or disclose, “wherein the radiation source comprises a plurality of

parallel light emitting diodes **having alternate anodes connected either to electrical ground or energized by a prescribed voltage and alternate cathodes connected either to electrical ground or energized by the prescribed voltage**". To support the rejection the Examiner relies on light source 15 of Gutjahr and Col. 5, lines 8 - 19. However, there is no teaching what so ever in Gutjahr at the cited reference with respect to the light source 15. In fact, the teaching is with respect to the detector arrangement 9 and the types of signals detected. There is no teaching with respect to the configuration of the light source. Therefore, because Gutjahr does not disclose or teach an element of the invention it cannot anticipate the Applicants' claims. Thus, Claim 2 is allowable, the rejection is improper, and it should be withdrawn.

Claim Rejections -35 USC § 103

Claim 7 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al. U.S. Patent No. 4,520,681, hereinafter Moore or Gutjahr et al. U.S. Patent No. 5,13,394 B1, hereinafter Gutjahr, in view of Pratt, Jr. et al. U.S. Patent No. 3,897,766. Applicants respectfully suggest that the Examiner has mischaracterized the teachings of Gutjahr. The Examiner states:

"With respect to Claim 7, Moore et al or Gutjahr et al discloses the claimed invention except for at least one sensor comprising a photodiode. Pratt, Jr. et al teaches a torque sensor with at least one sensor D1, D2 comprising a photodiode (col. 6 lines 60-64). It would have been obvious at the time the invention was made to one having ordinary skill in the art to modify Moore et al or Gutjahr et al with the teaching of Pratt, Jr. et al to include at least one sensor comprising a photodiode for the purpose of providing an electric signal which varies as a function of the amplitude level of light transmitted (see Pratt, Jr et al, col. 6 lines 65-68).

Applicants respectfully contend that explanation in the Office Action mischaracterizes the teachings of Moore and/or Gutjahr and that the cited references do not teach or disclose each element of the invention. For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a *prima facie* case of obviousness. *In re Fine*, U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). The Examiner must meet the burden of establishing that all

elements of the invention are disclosed in the prior art; that the prior art relied upon, coupled with knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

With regard to Claim 7, Applicants respectfully contend that neither Moore, Gutjahr, nor Pratt teach or disclose each element of the invention. Specifically, as stated above for Claim 1, neither Moore nor Gutjahr teach or disclose, “at least one signal conditioner receptive of the emitted radiation **and positioned on a shaft between the radiation source and the at least one sensor** thereby conditioning the emitted radiation”. Once again, as stated above, neither Moore nor Gutjahr teach or disclose, “a circuit receptive of the at least one intensity signal determining thereby the torque acting upon the shaft **and compensating for the attenuation of the emitted radiation.**” Therefore, because neither Moore nor Gutjahr disclose or teach an element of the invention they cannot render Applicants’ claims unpatentable. Thus, Claim 7 is allowable, the rejection is improper, and it should be withdrawn.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moore et al. U.S. Patent No. 4,520,681, hereinafter Moore or Gutjahr et al. U.S. Patent No. 5,13,394 B1, hereinafter Gutjahr in view of Dalton et al. U.S. Patent Application No. (US 2003/0010137 A1) hereinafter Dalton. Applicants respectfully suggest that the Examiner has mischaracterized the teachings of Gutjahr. The Examiner states:

“With respect to Claim 7, Moore et al or Gutjahr et al discloses the claimed invention except for at least one sensor comprising a photodiode. Dalton et al teaches a torque sensor with at least one sensor 160 comprising a photodiode (col. 4 [0027-0028]). It would have been obvious at the time the invention was made to one having ordinary skill in the art to modify Moore et al or Gutjahr et al with the teaching of Dalton et al to include at least one

sensor comprising a photodiode for the purpose of generating a signal which indicates the location of the centroid of illumination along the detection axes (see Dalton et al, col. 4 [0027,0030]).”

With regard to Claim 7, Applicants respectfully contend for the reasons previously stated that neither Moore, Gutjahr, nor Pratt teach or disclose each element of the invention. Therefore, because neither Moore nor Gutjahr disclose or teach an element of the invention they cannot render Applicants’ claims unpatentable. Thus, Claim 7 is allowable, the rejection is improper, and it should be withdrawn.

The arguments presented herein are made for the purposes of better defining the invention, rather than to overcome the rejections for patentability. The claims have not been amended to overcome the prior art and therefore, no presumption should attach that either the claims have been narrowed over those earlier presented, or that subject matter or equivalents thereof to which the Applicants are entitled has been surrendered. Allowance of the claims is respectfully requested in view of the above remarks. Moreover, no amendments as presented alter the scope of the claimed invention and therefore cannot necessitate a new grounds rejection.

It is believed that the foregoing remarks are fully responsive to the Office Action and that the claims herein should be allowable to the Applicants. Accordingly, reconsideration and withdrawal of the rejections are requested.

In the event the Examiner has any queries regarding the instantly submitted response, the undersigned respectfully requests the courtesy of a telephone conference to discuss any matters in need of attention.

If there are additional charges with respect to this matter or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully Submitted,

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